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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,666	06/21/2007	Johannes Baur	5367-243PUS - 299605	8470

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EXAMINER	
HSIEH, HSIN YI	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/587,666	BAUR ET AL.
	Examiner	Art Unit
	HSIN-YI HSIEH	2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _18 November 2011_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) _1,3-7 and 11-23_ is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) _1,3-7 and 11-23_ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _20110829, 20120126_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on 08/29/2011 and 01/26/2012 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. **Claims 1, 3-7, 11-16, 22 and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahama et al. (US 2004/0004223 A1) in view of Heikman (US 2005/0077538 A1).

5. Regarding **claim 1**, Nagahama et al. teach a thin-film LED (light emitting device; Abstract) comprising: an active layer (4; Fig. 1, paragraph [0072]), which (4) emits electromagnetic radiation (intrinsic property of LED; paragraph [0072]) in a main radiation direction (upward direction in Fig. 1 as implied in paragraph [0072]); a current expansion layer (p-side cladding layer 5; ; Fig. 1, paragraph [0072]), which is disposed downstream of (above) the active layer (4) in the main radiation direction (upward direction in Fig. 1) and is made of a first nitride compound semiconductor material (first layer of $In_XGa_{1-X}N$ ($0 \leq X \leq 1$); paragraph [0074]); a main area (the top surface of 7; Fig. 1, paragraph [0072]), through which the electromagnetic radiation (light) emitted in the main radiation direction (upward direction in Fig. 1) is coupled out (see Fig. 1, paragraph [0072]); and a first contact layer (p electrode 8; Fig. 1, paragraph [0072]) arranged on the main area (the top surface of 7), wherein a transverse conductivity of the current expansion layer (5) is increased by formation of a two-dimensional electron gas or hole gas (the hetero-junction of supper lattice can form either a two-dimensional electron or hole gas under suitable biasing, and the increase in transverse conductivity is an intrinsic property of formation of the two-dimensional electron or hole gas), wherein at least one layer (second layer of 5; paragraph [0073]) made of a second nitride compound semiconductor material ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$); paragraph [0074]) having a larger electronic band gap than the first nitride compound semiconductor material (paragraph [0074]) is sandwiched in the current expansion layer (5; i.e. laminated in the order of 1st layer, 2nd layer, 1st layer and so on; see paragraph [0073]) to form the two-dimensional electron gas or hole gas (the hetero-junction of supper lattice can form either a two-dimensional electron or hole gas under suitable biasing) in the current expansion layer (5), and wherein the at least one layer (second layer of 5) made of the

second nitride compound semiconductor material ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$)) has a doping (Mg doped; paragraph [0165]).

Nagahama et al. does not teach wherein the at least one layer made of the second nitride compound semiconductor material has a dopant concentration being higher in regions adjoining the current expansion layer than in a central region of the at least one layer made of the second nitride compound semiconductor material, and wherein the first and second nitride compound semiconductor materials are n-doped.

Regarding the limitation of "the first and second nitride compound semiconductor materials are n-doped", Nagahama et al. teach that the first and second nitride compound semiconductor materials (InXGa1-XN ($0 \leq X \leq 1$) and AlYGa1-YN ($0 \leq Y \leq 1$)) are both p-doped (paragraph [0073]). It would have been obvious to one of ordinary skill in the art at the time of invention was made to know that switching the polarities of the doping of a semiconductor device to opposite polarities is an obvious variant of the device of the original polarities and the device of the opposite polarity should also be functional. Thus it would be obvious to have the first and second nitride compound semiconductor materials being n-doped.

In the same field of endeavor of nitride semiconductor device, Heikman teaches the at least one layer (L1 of AlGaN layer having the interface I2; Figs. 1 and 4, paragraph [0022, 0029]) made of the second nitride compound semiconductor material (AlGaN; paragraph [0029]) has a dopant concentration being higher in regions (10 nm of graded region at interface I2, which is n doped to the density of the polarization charge; paragraph [0029]) adjoining the current expansion layer (L2 of GaN layer having the interface I2; Figs. 1 and 4, paragraph [0022, 0029]) than in a central region (the region of L1 outside the 10 nm of graded region, which is undoped;

Figs. 1 and 4, paragraph [0029]) of the at least one layer (L1) made of the second nitride compound semiconductor material (AlGaN).

It would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the inventions of Nagahama et al. and Heikman, and switch the doping polarities of the device of Nagahama et al. into opposite polarities, because the device of opposite polarities is an obvious variant of the original device, and using the doping concentration as taught by Heikman, because the sheet carrier density at interfaces are increased and the barrier for majority carrier transfer between channels is much reduced as taught by Heikman (paragraph [0030]).

6. Regarding **claim 3**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein a plurality of layers (second layers of 5; paragraph [0073]) made of the second nitride compound semiconductor material ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$); paragraph [0074]) are embedded in the current expansion layer (5; i.e. laminated in the order of 1st layer, 2nd layer, 1st layer and so on; see paragraph [0073]).

7. Regarding **claim 4**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein the at least one layer made of the second nitride compound semiconductor material (second layers of 5; paragraph [0073]) comprises a number of layers (second layers of 5; paragraph [0073]) made of the second nitride compound semiconductor material ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$); paragraph [0074]), wherein the number of layers is between 1 and 5 inclusive (can be one in a supper lattice of two layers; paragraph [0073]).

8. Regarding **claim 5**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein the at least one layer (second layer of 5; paragraph [0073]) made of the second nitride

compound semiconductor material ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$); paragraph [0074]) has a thickness of a range of 1 nm to 10 nm (10 angstroms to 100 angstroms; paragraph [0076]) which overlaps claimed range of 10 nm to 100 nm, and establishes a prima facie case of obviousness (MPEP 2144.05).

9. Regarding **claim 6**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein the first nitride compound semiconductor material is GaN ($In_XGa_{1-X}N$ ($0 \leq X \leq 1$) with X=0; paragraph [0074, 0131]).

10. Regarding **claim 7**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein the second nitride compound semiconductor material is $Al_xGa_{1-x}N$ where $0 \leq x \leq 1$ (paragraph [0074]) which overlaps the claimed range of $0.1 \leq x \leq 0.2$, and establishes a prima facie case of obviousness (MPEP 2144.05).

11. Regarding **claim 11**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein the active layer (4) includes $In_xAl_yGa_{1-x-y}N$ where $0 \leq x \leq 1$, $0 \leq y \leq 1$ and $x+y \leq 1$ (InGaN, i.e. $In_xAl_yGa_{1-x-y}N$ with y=0; paragraph [0072]).

12. Regarding **claim 12**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein at least one edge length (horizontal length in Fig. 1) of the main area (the top surface of 7).

Nagahama et al. do not teach wherein at least one edge length of the main area is 400 μm or more.

Parameters such as the one edge length of the main area in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired device performance such as the total output power during device fabrication. Therefore,

it would have been obvious to one of the ordinary skill in the art at the time the invention was made to incorporate the one edge length of the main area within the range as claimed in order to achieve desired total output power.

13. Regarding **claim 13**, Nagahama et al. also teach the thin-film LED as claimed in claim 12, wherein at least one edge length (horizontal length in Fig. 1) of the main area (the top surface of 7).

Nagahama et al. do not teach wherein at least one edge length of the main area is 800 μm or more.

Parameters such as the one edge length of the main area in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired device performance such as the total output power during device fabrication. Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to incorporate the one edge length of the main area within the range as claimed in order to achieve desired total output power.

14. Regarding **claim 14**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, the thin-film LED (Fig. 1).

Nagahama et al. do not teach wherein operation of the thin-film LED with a current intensity of 300 mA or more is provided.

This limitation is considered as "intended use". It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

15. Regarding **claim 15**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein the first contact layer (p electrode 8) comprises no aluminum (p-electrode consisting of Ni and Au; paragraph [0372]).

16. Regarding **claim 16**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein a portion of the total area of the main area (the top surface of 7) is covered by the first contact layer (8).

Nagahama et al. do not teach wherein less than 15% of the total area of the main area is covered by the first contact layer.

Parameters such as the percentage of the total area of the main area covered by the first contact layer in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired device performance during device fabrication. Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to incorporate the percentage of the total area of the main area covered by the first contact layer within the range as claimed in order to achieve desired device performance.

17. Regarding **claim 22**, Nagahama et al. also teach the thin-film LED as claimed in claim 1, wherein the current expansion layer (5) includes two partial layers (two first layers; paragraph [0072]) made of the first nitride compound semiconductor material (first layer of $In_XGa_{1-X}N$ ($0 \leq X \leq 1$)) separated from one another by the at least one layer made of the second nitride compound semiconductor material (second layers of ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$)), i.e. laminated in the order of 1st layer, 2nd layer, 1st layer and so on; paragraph [0073]).

18. Regarding **claim 23**, Nagahama et al. teach a thin-film LED (light emitting device; Abstract) comprising: an active layer (4; Fig. 1, paragraph [0072]), which (4) emits electromagnetic radiation (intrinsic property of LED; paragraph [0072]) in a main radiation direction (upward direction in Fig. 1 as implied in paragraph [0072]); a current expansion layer (p-side cladding layer 5; ; Fig. 1, paragraph [0072]), which is disposed downstream of (above) the active layer (4) in the main radiation direction (upward direction in Fig. 1) and is made of a first nitride compound semiconductor material (first layer of $In_XGa_{1-X}N$ ($0 \leq X \leq 1$); paragraph [0074]); a main area (the top surface of 7; Fig. 1, paragraph [0072]), through which the electromagnetic radiation (light) emitted in the main radiation direction (upward direction in Fig. 1) is coupled out (see Fig. 1, paragraph [0072]); and a first contact layer (p electrode 8; Fig. 1, paragraph [0072]) arranged on the main area (the top surface of 7), wherein a transverse conductivity of the current expansion layer (5) is increased by formation of a two-dimensional electron gas or hole gas (the hetero-junction of supper lattice can form either a two-dimensional electron or hole gas under suitable biasing, and the increase in transverse conductivity is an intrinsic property of formation of the two-dimensional electron or hole gas), wherein at least one layer (second layer of 5; paragraph [0073]) made of a second nitride compound semiconductor material ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$); paragraph [0074]) having a larger electronic band gap than the first nitride compound semiconductor material (paragraph [0074]) is sandwiched in the current expansion layer (5; i.e. laminated in the order of 1st layer, 2nd layer, 1st layer and so on; see paragraph [0073]) to form the two-dimensional electron gas or hole gas (the hetero-junction of supper lattice can form either a two-dimensional electron or hole gas under suitable biasing) in the current expansion layer (5), and wherein the at least one layer (second layer of 5) made of the

second nitride compound semiconductor material ($Al_YGa_{1-Y}N$ ($0 \leq Y \leq 1$)) has a doping (Mg doped; paragraph [0165]).

Nagahama et al. does not teach wherein the at least one layer made of the second nitride compound semiconductor material has a dopant concentration being higher in regions adjoining the current expansion layer than in a central region of the at least one layer made of the second nitride compound semiconductor material, and wherein the dopant concentration in the regions adjoining the current expansion layer is higher than in a dopant concentration in the current expansion layer, and wherein the first and second nitride compound semiconductor materials are n-doped.

Regarding the limitation of "the first and second nitride compound semiconductor materials are n-doped", Nagahama et al. teach that the first and second nitride compound semiconductor materials (InXGa1-XN ($0 \leq X \leq 1$) and AlYGa1-YN ($0 \leq Y \leq 1$)) are both p-doped (paragraph [0073]). It would have been obvious to one of ordinary skill in the art at the time of invention was made to know that switching the polarities of the doping of a semiconductor device to opposite polarities is an obvious variant of the device of the original polarities and the device of the opposite polarity should also be functional. Thus it would be obvious to have the first and second nitride compound semiconductor materials being n-doped.

In the same field of endeavor of nitride semiconductor device, Heikman teaches the at least one layer (L1 of AlGaN layer having the interface I2; Figs. 1 and 4, paragraph [0022, 0029]) made of the second nitride compound semiconductor material (AlGaN; paragraph [0029]) has a dopant concentration being higher in regions (10 nm of graded region at interface I2, which is n doped to the density of the polarization charge; paragraph [0029]) adjoining the current

expansion layer (L2 of GaN layer having the interface I2; Figs. 1 and 4, paragraph [0022, 0029]) than in a central region (the region of L1 outside the 10 nm of graded region, which is undoped; Figs. 1 and 4, paragraph [0029]) of the at least one layer (L1) made of the second nitride compound semiconductor material (AlGaN), and wherein the dopant concentration (the density of the polarization charge) in the regions (10 nm of graded region at interface I2) adjoining the current expansion layer (L2) is higher than in a dopant concentration in the current expansion layer (L2; L2 is undoped; paragraph [0029]).

It would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the inventions of Nagahama et al. and Heikman, and switch the doping polarities of the device of Nagahama et al. into opposite polarities, because the device of opposite polarities is an obvious variant of the original device, and using the doping concentration as taught by Heikman, because the sheet carrier density at interfaces are increased and the barrier for majority carrier transfer between channels is much reduced as taught by Heikman (paragraph [0030]).

19. **Claims 17-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahama et al. and Heikman as applied to claim 1 above, and further in view of Nozaki et al. (US 5,744,828 A).

Nagahama et al. teach, regarding to **claim 17**, wherein the first contact layer (8) has a lateral structure (see Fig. 1) comprising a contact area (the interfacial area between 7 and 8; see Fig. 1), and regarding to **claim 18**, the contact area (the interfacial area between 7 and 8; see Fig. 1).

Nagahama et al. and Heikman do not teach, regarding to **claim 17**, wherein the first contact layer has a lateral structure comprising a plurality of contact webs, regarding to **claim 18**, wherein the contact area is surrounded by at least one frame-type contact web, the frame-type contact web being connected to the contact area by means of at least one further contact web, regarding to **claim 19**, wherein the frame-type contact web has a square, rectangular or circular form, and regarding to **claim 20**, wherein the number of frame-type contact webs is one, two or three.

In the same field of endeavor of LED, Nozaki et al. teach, regarding to **claim 17**, wherein the first contact layer (excitation electrode 20; Fig. 1, col. 3 line 58) has a lateral structure (see Fig. 1) comprising a plurality of contact webs (current supply electrode 22; Fig. 1, col. 3 lines 60-61), regarding to **claim 18**, wherein the contact area (bonding pad 21; Fig. 1, col. 3 line 60) is surrounded by at least one frame-type contact web (current supply electrode 22; Fig. 1, col. 3 lines 60-61), the frame-type contact web (22) being connected to the contact area (21) by means of at least one further contact web (straight lines 22a; Fig. 1, col. 4 line 14), regarding to **claim 19**, wherein the frame-type contact web (22) has a square, rectangular or circular form (square form; see Fig. 1), and regarding to **claim 20**, wherein the number of frame-type contact webs (22) is one, two or three (three; see Fig. 1).

It would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the inventions of Nagahama et al., Heikman, and Nozaki et al. and use the frame-type contact web as taught by Nozaki et al., because the frame-type contact web lets the device uniformly emit light, to thereby improve the light emission efficiency of the device as taught by Nozaki et al. (col. 5 lines 12-16).

20. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahama et al. and Heikman as applied to claim 1 above, and further in view of Schubert (US 2003/0111667 A1).

21. Regarding **claim 21**, Nagahama et al. also teach the first contact layer (8).

Nagahama et al. and Heikman do not teach wherein a second contact layer, which reflects the electromagnetic radiation emitted by the active layer, is provided on a side of the active layer opposite to the first contact layer, the first contact layer having a contact area and the second contact layer having a cutout in a region opposite the contact area.

In the same field of endeavor of LED, Schubert teaches wherein a second contact layer (ohmic contacts 182 and reflective film 184; Fig. 8, paragraph [0029]), which reflects the electromagnetic radiation (paragraph [0029]) emitted by the active layer (emitting region 124; Fig. 8, paragraph [0024]), is provided on a side (bottom side) of the active layer (active region 120; Fig. 8, paragraph [0024]) opposite to the first contact layer (top contact 109; Fig. 8, paragraph [0024]), the first contact layer (109) having a contact area (the contact area between 109 and 160) and the second contact layer (182 and 184) having a cutout (central portion 185) in a region (185) opposite the contact area (the contact area between 109 and 160; see Fig. 8).

It would have been obvious to one of ordinary skill in the art at the time of invention was made to combine the inventions of Nagahama et al., Heikman, and Schubert and use the ohmic contacts as taught by Schubert, because the ohmic contacts increase the portion of the light that reaches and is reflected by the underling reflective film and also increase the light extraction efficiency as taught by Schubert (paragraph [0029]).

Response to Arguments

22. Applicant's arguments filed 11/18/2011 have been fully considered but they are not persuasive.

23. On pages 10-12 of Applicant's Response, Applicant argues that Nagahama and Heikman fail to disclose, teach or suggest that "the at least one layer made of the second nitride compound semiconductor material has a doping, a dopant concentration being higher in ***regions adjoining the current expansion layer than in a central region*** of the at least one layer made of the second nitride compound semiconductor material" of claim 1 because the n doping is placed only at even numbered GaN/AlGaN interfaces and there is no doing at odd numbered GaN/AlGaN interfaces.

24. The Examiner respectfully disagrees with Applicant's argument, because "regions adjoining the current expansion layer" only means plural regions adjoining the current expansion layer and does not mean all regions adjoining the current expansion layer. Heikman teaches that the n doping is placed at even numbered GaN/AlGaN interfaces, i.e. plural regions adjoining the current expansion layer. Thus Heikman teaches these limitations.

25. On pages 12-13 of Applicant's Response, Applicant argues that Nagahama and Heikman fail to teach "the first and second nitride compound semiconductor materials are n-doped" because Heikman teaches placing its n-doped intermediate layers at every second interface of an undoped structure for compensating polarization charges which are present at these interfaces.

26. The Examiner respectfully disagrees with Applicant's argument, because the n-doped intermediate layers is a part of the first and second nitride compound semiconductor materials.

Thus the first and second nitride compound semiconductor materials are n-doped. Furthermore, the n doping is at the GaN/AlGaN interfaces which means both the regions of GaN layer and regions of the AlGaN layer adjacent to the interfaces are n doped as shown in paragraph [0033].

Conclusion

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HSIN-YI HSIEH whose telephone number is (571)270-3043. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LYNNE GURLEY/
Supervisory Patent Examiner, Art Unit 2811

/H. H./
Examiner, Art Unit 2811
3/17/2012